

## DISPERSAL AND RANGE EXPANSION OF AN INTRODUCED SAND WASP, *OXYBELUS BIPUNCTATUS* (HYMENOPTERA: SPHECIDAE), IN NORTHEASTERN NORTH AMERICA<sup>1</sup>

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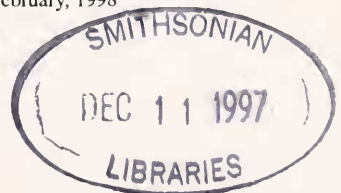
**ABSTRACT:** Range expansion of an introduced sphecid, *Oxybelus bipunctatus*, is traced through the northeastern United States and southeastern Canada. This species apparently is displacing *O. unigulmis quadrinotatus*, a species with similar behavior and ecology, in abundance as it moves northward through the Great Lakes Region, St. Lawrence River Valley, and Maritime Provinces to become the most common *Oxybelus* in small inland sandy areas. Its southward dispersal probably is limited by climatic, ecological and edaphic factors such as high summer and warm winter temperatures, thermal soil temperature regime, and absence of appropriate sandy soils.

*Oxybelus bipunctatus* Olivier is a small digger wasp that usually excavates 1- and 2-celled nests in sandy soil, impales adult flies on its sting, removes the temporary nest closure with the fly still impaled, and stocks its cells mostly with several male Brachycera and/or Cyclorhapha (Peckham et al. 1973; Krombein 1979; Kurczewski 1996). This wide ranging Holarctic species evidently was accidentally introduced into the northeastern United States from Europe before 1935 (Pate 1943; Krombein 1979), perhaps in ship ballast or molding sand deposited dockside. Based upon insect museum specimens, the earliest dates of its occurrence in North America are 1935 from Essex County, New Jersey and Hampden County, Massachusetts, and 1936 from Suffolk County, New York (Table 1). By the 1940's *O. bipunctatus* was firmly established in the Middle Atlantic Region and New England (Pate 1945, pers. obs.). Since that time the range of this species has been expanding primarily northward, most recently into western upper Michigan, central Wisconsin, and Nova Scotia.

Within 10 years of its introduction into the U. S., the range of *O. bipunctatus* extended to Washington, D. C., a distance of over 300 km from its first North American collection locality (Fig. 1). In only 20 years' time, this species dispersed to North Bay, Ontario and central lower Michigan, a distance of 660-900 km. In less than 50 years, *O. bipunctatus* moved as far west as western upper Michigan and central Wisconsin, a distance of 1,250 km. On a smaller scale, this species dispersed from Ottawa to North Bay, Ontario, probably across sandy sections of the Ottawa-Mattawa River Valley, a distance of about 300 km,

<sup>1</sup> Received March 21, 1997. Accepted June 29, 1997.

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in nine years (1947-1956). *Oxybelus bipunctatus* moved from Clinton County to Ogemaw County, Michigan, a distance of about 170 km, in five years (1954-1959). Using these durations and distances as gauges of dispersal, the rate of movement of *O. bipunctatus* amounted to approximately 30-45 km per year assuming the species was not transported to these regions by some means other than its own flight. This is a remarkably rapid rate of dispersal for a species limited to short flights by its small size and stocky build, although the possibility of wind carriage should not be overlooked.

In only a half century, this species dispersed through New England to the Maritime Provinces (New Brunswick, Nova Scotia) and St. Lawrence River Valley (southern Quebec), across the Great Lakes Region (upstate New York, southern Ontario, northwestern Pennsylvania, northern Ohio, upper and lower Michigan, central Wisconsin), and down the Atlantic Coastal Plain to Maryland, District of Columbia, and northern Virginia (Table 1, Fig. 1). The lack of specimens of *O. bipunctatus* from southern Ohio and southern Virginia indicate that its southward dispersal may be climatically and ecologically limited by factors such as high summer and warm winter temperatures and/or thermal soil temperature regime (USDA 1984), or it may simply reflect inappropriate habitat (soils) for this species in these areas.

Despite its adventive status, *O. bipunctatus* is one of the most common species in small inland sandy areas in the northeast (Kurczewski and Harris 1968; Kurczewski and Acciavatti 1990). O'Brien (1996 pers. comm.) found it to be the most numerous species of *Oxybelus* in Malaise traps at the Huron Mountain Club, Marquette County, Michigan beginning in the early 1980's (Fig. 1). McCorquodale (1997 pers. comm.) indicated that this species is more common than any other species of *Oxybelus* in sandy areas on Cape Breton Island, Nova Scotia. Its abundance in these regions probably can be attributed to cold hardiness, long flight season, relatively short generation time, wide prey selection (Peckham et al. 1973; Krombein 1979; Kurczewski 1996), scarcity of natural enemies (Spofford and Kurczewski 1990), and ubiquity in nesting habitat. *Oxybelus bipunctatus* nests opportunistically in such varied places as flower pots, children's sand boxes, temporary highway sand piles, and the sand bases of swimming pools. Because of its small size and capability to nest shallowly in soil, it is an excellent candidate for transport by human means from one place to another including transoceanic portage.

Although quantitative data are unavailable, *O. bipunctatus* apparently is supplanting *O. uniglumis quadrinotatus* in abundance in sandy and gravelly areas as it disperses northward through the Great Lakes Region, St. Lawrence River Valley, and Maritime Provinces. The displacement in upstate New York began rather suddenly during the 1950's (Evans 1960 pers. comm.). *Oxybelus bipunctatus* appeared in the Ithaca, New York area as early as 1937 (Pate 1943), possibly transported there by human means, and by the 1960's it was flourish-

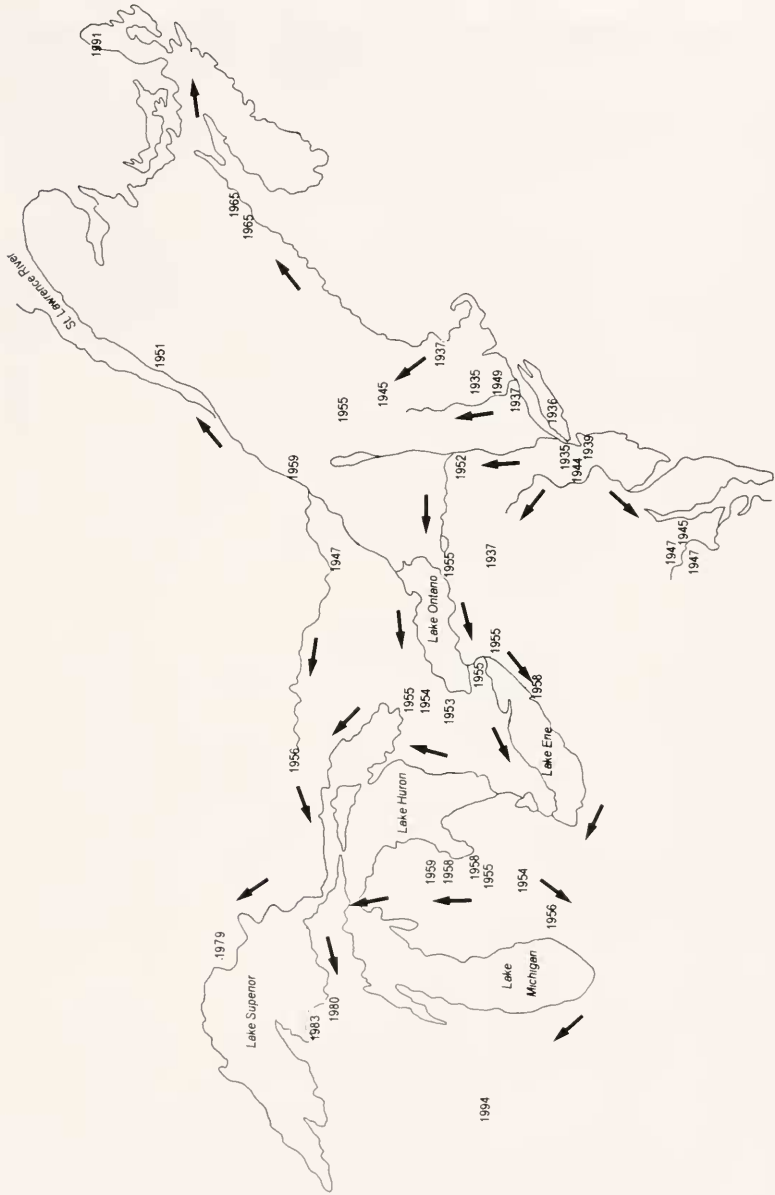


Fig. 1. Regional dispersal of *Oxybelus bipunctatus* by year of collection. Arrows indicate probable dispersal pathways.

ing in small inland sandy areas of upstate New York (Kurczewski and Harris 1968; Peckham et al. 1973; Kurczewski and Acciavatti 1990). *Oxybelus bipunctatus* is now the most abundant member of the genus in northeastern United States and southeastern Canada (pers. obs.). Some nesting aggregations

Table 1. Pre-1955 dates and localities of collection of *Oxybelus bipunctatus* arranged in chronological order.

DATE	LOCALITY	SOURCE
July 4, 1935	Bloomfield, Essex County, NJ	AMNH
July 29, 1935	Holland, Hampden County, MA	MCZ
June 7, 1936	Half Hollows, Suffolk County, NY	Pate 1943
July 11, 1937	Reading, Middlesex County, MA	MCZ
August 2, 1937	Durham, Middlesex County, CT	MCZ
August 2, 1937	Ithaca, Tompkins County, NY	Pate 1943
August 31, 1939	Kearny, Hudson County, NJ	AMNH
July 2, 1944	Princeton, Mercer County, NJ	USNM
May 4, 1945	Stinson Lake, Grafton County, NH	CU
July 23-25, 1945	Washington, DC	USNM
July 24, 1945	Washington, DC	Pate 1945
June 23, 1946	Princeton, Mercer County, NJ	USNM
[F12], 1947	Princeton, Mercer County, NJ	USNM
June 11-July 15, 1947	Washington, DC	USNM, MSU
June 22-29, 1947	Arlington, Fairfax County, VA	USNM
June 27, 1947	Silver Springs, Montgomery County, MD	USNM, UCD
July 3, 1947	Ottawa, Municipality of Ottawa-Carleton, ONT	CNC
June 15, 1949	East Hartford, Hartford County, CT	CU
July 14, 1951	Parke Reserve, Kamouraska County, QUE	CNC
July 22, 1952	Rensselaerville, Albany County, NY	USNM
June 7-August 20, 1953	Ithaca, Tompkins County, NY	MCZ, USNM
July 26, 1953	Guelph, Wellington County, ONT	UG
June 25, 1954	Guelph, Wellington County, ONT	UG
July 8, 1954	Clinton County, MI	MSU
July 9, 1954	Orangeville, Dufferin County, ONT	UG
September 8, 1954	Ithaca, Tompkins County, NY	MCZ

Abbreviations for insect museums are as follows: AMNH, The American Museum of Natural History; CNC, Canadian National Collection; CU, Cornell University; MCZ, Museum of Comparative Zoology, Harvard University; MSU, Michigan State University; UCD, University of California-Davis; UG, University of Guelph; and, USNM, United States National Museum.

of this species number several hundred individuals (Peckham et al. 1973; Kurczewski and Acciavatti 1990).

Why is *O. bipunctatus* displacing *O. uniglumis quadrinotatus* in the north-eastern United States and southeastern Canada? Although the two species seemingly have identical nesting behaviors and similar ecological requirements (Peckham et al. 1973), *O. uniglumis quadrinotatus* is almost twice the size of *O. bipunctatus*. Because of this size difference the two species might be expected to prey upon different families, genera and species of flies. However, they capture some of the same groups of prey with *O. uniglumis quadrinotatus* taking a slightly greater proportion of Cyclorhapha and fewer Brachycera than *O. bipunctatus*. Within the suborder Cyclorhapha, there is some predation on the same species of flies (Peckham et al. 1973; Krombein 1979). *Oxybelus uniglumis quadrinotatus* never captures Nematocera while *O. bipunctatus* occasionally preys upon mosquitos, midges, and blackflies (Evans 1963; Kurczewski 1996). A broader spectrum of prey, smaller size and inconspicuousness, potentially fewer predators, and a lower rate of cleptoparasitism (Spofford and Kurczewski 1990) are some reasons why *O. bipunctatus* is more successful and, therefore, more numerous than *O. uniglumis quadrinotatus* in many sandy areas of the northeastern U. S. and southeastern Canada.

#### ACKNOWLEDGMENTS

The following persons provided specimens, collection data, and/or abundance information for *O. bipunctatus*: Bert Finnamore, Alberta Provincial Museum; Rick Hoebeke, Cornell University; Michael Kelly, Museum of Comparative Zoology, Harvard University; Lynn Kimsey, University of California-Davis; Steve Krauth, University of Wisconsin-Madison; Lubomir Masner, Canadian National Collection; David McCorquodale, Guelph University, Nova Scotia Natural History Museum, and University College of Cape Breton; Ron McGinley and Arnold Menke, United States National Museum; Mark O'Brien, Museum of Zoology, The University of Michigan; Mark Snethurst, The American Museum of Natural History; Andrey Sharkov, The Ohio State University; Jeff Skevington, Pinery Provincial Park; Don Snitgen, Northern Michigan University; and John Wilterding, Michigan State University. I am grateful to David McCorquodale and two anonymous reviewers for critically reviewing the manuscript. Julie Cushine-Rigg finalized Figure 1.

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## SCIENTIFIC NOTE

***EUHRYCHIOPSIS LECONTEI***  
**(COLEOPTERA: CURCULIONIDAE):**  
**A NEW STATE REPORT FOR INDIANA<sup>1</sup>**

R.D. Waltz<sup>2</sup>, G.M. White<sup>3</sup>, R.W. Scribailo<sup>4</sup>

The range of the native North American aquatic weevil species *Euhrychiopsis lecontei* (Dietz) is poorly documented (Sheldon and O'Bryan 1996) although it has been reported from coast to coast in various northern and central states including Iowa, Michigan, Wisconsin, Alberta, British Columbia, and Saskatchewan (O'Brien and Wibmer 1982), Washington (Creed and Sheldon 1994), Minnesota (Newman and Maher 1995), and Connecticut, Illinois, Massachusetts, New York and Vermont (Sheldon and O'Bryan 1996). Because this species is recognized as a potentially effective endemic biological control agent of watermilfoils (Haloragaceae: *Myriophyllum* spp.) (Creed and Sheldon 1993; Sheldon and O'Bryan 1996), records of its distribution are of special interest to those managing lakes and to those who have an interest in the documentation of insect faunas within regional or politically delineated contexts.

*Euhrychiopsis lecontei* has not been reported previously from Indiana (above citations; Blatchley and Leng 1916; Downie and Arnett 1996). Herein, we report the first known record of this species in Indiana. Voucher specimens were taken from: In: LaPorte Co., Saugany Lake, May 16, 1997, G.M. White, collected in association with Eurasian watermilfoil (*Myriophyllum spicatum* L.). Voucher specimens have been deposited at Purdue University Entomological Research Collections, West Lafayette, Indiana.

Adults were collected and numerous eggs were observed on the stem apices of Eurasian  
 (continued on page 14)

<sup>1</sup> Received June 7, 1997. Accepted July 4, 1997.

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